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CORRESPONDENCE.

On Making Civil Engineers' Pocket-Books.

Sir: Your review of the new "American" Civil Engineers' Pocket Book, in your issue of Feb. 16, places us upon the defensive in two respects:

(1) Referring incidentally to "The" Civil Engineers' Pocket-Book, you say:

> The elder Trautwine found it necessary to adapt the style of his book to the mathematical skill of the "practical" engineer, the man who never had scientific training, or else had forgotten the algebra and other refinements learned in college.

In the absence of qualification, this leaves the reader under the mistaken impression that we still follow this old policy, whereas, for the last quarter-century, we have had constantly before us the fact that "the profession is made up largely of men who have been through an engineering college."

While we still avoid the burying of simple facts under "heaps of mathematical rubbish" (mathematics which even the college-bred engineer has "long since forgotten," we have adapted our practice to the requirements and abilities of the modern engineer, who is reasonably familiar with the mathematical essentials; a policy which, in any case, would have been forced upon us by the necessity of condensing a maximum of information within the narrow limits of a book which, although it has long taxed the capacity of even an engineer's pocket, is still carried in his grip-sack.

(2) Referring to the "American" Pocket Book, you say:

> A size of page was chosen which makes the book markedly handier than any existing pocket-book. It is somewhat wider and considerably higher than the usual page; mainly through the latter increase the page gains in contents and readability, and the finished volume gains in convenience, to an extent that will earn every user's appreciation.

The "American" pocket-book, using a slightly longer line and slightly wider type, gets as many words in a line as we do, but it has only 54 lines per standard page, as against 70 in "Trautwine." Thus, instead of gaining in contents (as you say) the new page loses about 23%. In "a condensed technical library" this loss of contents, and increase of bulk, are relatively immaterial, and it is offset, as you say, by a gain in "readability"; but, in our Pocket-Book, the necessity for condensation forbids our indulgence in these luxuries; and we submit that the difference, in "handiness" and "convenience" is scarcely "marked," and that (such as it is) it would seem to be with the smaller page.

In the same issue of your Literature Supplement, Mr. Frederic I. Winslow, Librarian, Boston Society of Civil Engineers, suggests the propriety of printing engineers' hand books upon India paper, and mentions a copy of "Vanity Fair," on such paper, containing 784 pages (392 leaves) making a thickness of 0.53-in., or 1.35 ins. per thousand leaves.

We looked into this question some eight years ago, and concluded (for reasons stated below) that such a change was not then advisable.

We have made a comparison of special thin papers, with results as follows:

American Civil Engineers' Pocket-Book	2.00 ins. per 1,000 leaves.
Trautwine's Civil Engineers' Pocket-Book	1.83 ins. per 1,000 leaves.
Baedeker's Guide Books	1.73 ins. per 1,000 leaves.
Encyclopedia Britannica, new edition	1.65 ins. per 1,000 leaves.
"Vanity Fair"	1.35 ins. per 1,000 leaves.

From our printers and binders, we learn that the cost of manufacturing our book would be increased 50% by the substitution of India paper. This additional cost is but a small portion of the total cost of editing, revising, and manufacturing the book; but, judging from the behavior of a dummy made up with India paper, we believe that the slight gain in thinness and the considerable gain in lightness, would be much more than offset by the resulting inconvenience of handling the book, the paper being very deficient in that elasticity which renders it easy to turn quickly from page to page, in our standard engineers' pocket-books.

In a novel, in the Encyclopedia Britannica, or in a treatise upon engineering, where the pages are turned but seldom, this difficulty would not be serious; but in using a table where the turning of pages consumes a considerable portion of the time, this difficulty would be a very serious matter, and it is aggravated when the edges of the pages are gilded, as is usual in our engineers' pocket-books.

Moreover, the leaves are much more liable to "fold under," in bunches; a feature which would soon render the book unserviceable.

While any saving of bulk in a pocket-book is in itself an advantage, it must be borne in mind that the saving due to the use of India paper would be trifling compared with that due to the use of the papers and the small type now used in engineers' pocket-books.

A copy of "Kent" or of "Trautwine" contains about as much material as do seven of the eight large volumes of a recently published Encyclopedia of Civil Engineering.

John C. Trautwine, Jr.
John C. Trautwine, 3d.

257 South Fourth St., Philadelphia, Pa., March 2, 1911.

REVIEWS.

Applied Engineering Mathematics.

ENGINEERING MATHEMATICS.—A Series of Lectures Delivered at Union College. By Charles Proteus Steinmetz, A. M., Ph. D.; Past President of American Institute of Electrical Engineers. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9½ ins.; pp. 292; 92 illustrations in text; two appendixes; tables. $3, net.

Whether this book is to be regarded primarily as a work on electrical engineering or as a text book of mathematics, it is of high excellence Engineers of all classes should buy and read it. The subjects which it treats are all to be found in available mathematics books, but separately, not brought together in the grouping here found. And instead of a purely mathematical discussion Mr. Steinmetz gives the matter in "applied" form, looking wholly to its practical use in engineering calculations. Prof. Perry's "Calculus for Engineers" may be compared with the present work, in a measure, although Steinmetz deals principally with algebra. Perry's text, however, is a continuous, logical development of an entire subject, while Steinmetz devotes his book to a few isolated parts which, while important in engineering calculations, are omitted from school text books, or at best are very inadequately treated there.

Another difference between the two works is that Perry takes examples from many fields, while Steinmetz uses electrical applications exclusively. This is what gives the new book its strong electrical flavor. The author could just as well, and perhaps more clearly, have illustrated exponential series and Fourier and other trigonometrical series by cases of vibrating bodies, or sound, or perhaps even hydraulics. But of course he had the electrical applications alone in view, and the whole object of his book is to teach electrical engineers. Therefore, he calls only on phenomena of transient and periodic electric currents and current disturbances for applications of the mathematical methods. The fact is worth noting, in this connection, that most engineers other than electrical can get along excellently well without skill in handling complex numbers and wave series, whereas the electrical student ought to have these subjects at his fingers' ends.

The book opens with a discussion of the geometrical representation of the number system and arithmetical operations, which lead to a full exposition of imaginaries and complex numbers. The treatment is gratifyingly logical and complete in its 51 pages, yet it is likely to offer some difficulties to him who studies it without the assistance of a teacher. The second chapter (42 pp). discusses algebraic series, with special reference to potential series; the exponential function is then derived from the integral of the proportional-increment formula (Perry calls it the compound-interest law), and its properties and uses are well discussed. Incidentally the exponential expressions for *sin* and *cos* are derived by the help of their potential series developments. Trigonometric series are treated in chapter III. (53 pp.). This begins with a brief statement of angle and triangle formulas, and then plunges into an explanation of how to analyze a wave-shape from either graphical or numerical data. The analysis of a record of mean daily temperatures at Schenectady is used by the author in interesting manner to show the use of the method. The other applications are electrical. Maxima and minima are discussed in the next chapter (40 pp); while little of this matter is not fully impressed on students in their regular engineering mathematic courses, there are numerous valuable suggestions on the determination of extreme values in practical cases. Still more noteworthy is the fact that a very clear statement of the method of least squares is appended to this chapter.

The three remaining chapters of the book are of equal value to all classes of engineers. The subjects are: "Methods of Approximation," "Empirical Curves" and "Numerical Calculations." The first gives the ways in which complicated algebraic or transcendental expressions can be reduced to simple forms approximately equivalent for a certain range of values, the principal one being development in a potential series and dropping higher powers of the series. Under Empirical Curves the most common curve forms are portrayed and discussed, and methods are taught for determining the constants of a formula from observation data. The last chapter finally treats of degree of precision and reliability of numerical computations, and gives very excellent advice on curve plotting, etc. These three chapters, covering 95 pages, are well worth buying the book for. An appendix entitled "Notes on the Theory of Functions" will find relatively few readers, in spite of its excellently compact and clear form.

THE ELEMENTS OF GRAPHIC STATICS AND OF GENERAL GRAPHIC METHODS.—By William Ledyard Cathcart, M. Am. Soc. Naval En., Soc. of Naval Architects and Marine Engineers, Am. Soc. M. E.; and J. Irvin Chaffee, A. M., Professor of Mathematics, Webb's Academy of Naval Architecture and Marine Engineering; M. Soc. Naval Architects and Marine Engineers. New York: D. Van Nostrand Co. Cloth; 6 × 9 ins.; pp. 312; 159 text illustrations. $3, net.

The opening chapters of this new text on Graphic Statics have a very favorable influence toward preparing the mind for a readier understanding of the main part of the subject. In the first the operations of arithmetic (addition, multiplication, etc.), are transferred into graphical procedure, while in the second chapter areas and their comparison by linear measure are discussed. Statics is begun in the third chapter. The graphical computation of moments, which has an entire chapter, leads up to applied mechanics, where beams, trusses, friction at bearings and joints and shafting stresses are treated. The larger part of the book, in fact, is concerned with applied statics rather than the pure statics to which texts on this subject are usually restricted. On this account the book commends itself to a wide circle. The style is clear, and the text seems as well adapted to self-study as to school instruction. Satisfactory mechanical make-up and a low price further commend the book.

The Latrine Septic Tank, Percolating Filters and Contact Beds in India.

SEWAGE DISPOSAL IN THE TROPICS.—By Wm. Wesley Clemesha, M. D. (Vict.), D. P. H., Major I. M. S., Sanitary Commissioner, Bengal Professor of Hygiene, Calcutta University; Late Officiating Sanitary Commissioner, Madras. Calcutta and Simla, India: Thacker, Spink & Co. London, England: W. Thacker & Co. Cloth; 5½ × 8½ ins.; pp. 232; numerous folding plates and text illustrations. 15s., net. [American price, $6.]

Taking into consideration its somewhat limited scope, this is one of the most interesting books on sewage disposal which has ever appeared. We speak of the book as having a limited scope because, although it considers septic tanks and both percolating and contact filters in detail, yet it is primarily devoted to a very interesting local combination of the latrine and the septic tank, adapted particularly to the needs of large or small mills and other industrial establishments in India. Broadly speaking, in so far as percolating filters and contact beds are considered, it is from the viewpoint of their adaptability to the further purification of latrine septic tank efforts, in cases where further treatment is necessary.

Two or three special features of the sewage-disposal problem as presented to our author and others similarly located in India need to be mentioned before outlining the contents of the book. In the first place, the sewage dealt with is not only very strong, but it is also both very fresh and almost wholly vegetarian in character, owing to the oriental diet. The freshness of the sewage may the better be understood when it is explained that the latrines are generally located directly above the septic tanks. Likewise, the strength of the sewage will be appreciated when it is said that in many instances it appears to be diluted with only 6 U. S. gals. of water per contributing individual. In other words, these latrine septic tanks deal virtually with night soil only, and the freshest possible night soil at that, but diluted with enough water to warrant using the term sewage disposal.

Another marked peculiarity of the sewage-disposal problem as here treated is the necessity of doing away as far as possible with mechanical appliances of any kind and of confining the labor, so far as may be, to the lowest class of natives. On the latter account, in the few cases where it is considered advisable to use anything approaching in mechanical character to the water-closet as known in other countries, flushing by pedals is advised. These and other limitations are due to caste. No native mechanic, it appears, will have anything to do with any mechanism associated with sewage disposal. Accordingly, both ordinary administrative work and repairs must be done by either the very lowest class of laborers or by foreigners. Such native laborers as are available are not only unreliable, but in addition are very superstitious. Thus the author states, after speaking of the difficulties involved in getting men to go out in the rain or at night to operate valves:

> What can you expect from the class of man, who refuses to do any work, because he reports that he found a devil sitting on the valve handle?

The author states in his preface that

> The first systematic study of the biological process of Sewage Disposal in the Tropics was commenced by Dr. Fowler and myself in January, 1906. Previous to this time, a certain amount of work had been done in the sterilization of tank effluent and on such practical matters as the best flushing apparatus and the most advantageous arrangement of the latrine; but nothing of the nature of a programme of chemical research was undertaken until Dr. Fowler visited Bengal. To him is due the credit of starting and systematizing the research work. The report on "Septic Tanks in Bengal," published by him, covered a great deal of ground, but it was not to be expected that in three months all the problems connected with this complex subject could be fully worked out. His work has been continued on since his departure, and it now appears to be desirable to publish the results in a form that will be most useful to Sanitary Officers, District Engineers, and all who are interested in the improvement of sanitary conditions in the East. It is not maintained that any finality has been reached in this subject; much work remains to be done; many problems are at present being worked out in our laboratory, the results of which will be published later on.

After a brief introduction, the design of the peculiar type of latrines used in India is taken up, and after this the design of the tank placed beneath the latrine. Owing, among other things, to the difficulties already explained, latrines with seats, as we understand the word seats here, are not advised, but rather mere open troughs. These troughs may or may not be divided by partitions for individual users, but in any case it is common practice to provide a roughened place for the feet of the user of the latrine. These foot places, with the adjacent surfaces on or near the floor level, are called "seats."

In the type of septic tank found best suited to the conditions already described, what the author terms a "grit chamber" plays an important part. This really is not a grit chamber at all, as grit chambers are understood in other parts of the world, but is simply a primary or receiving compartment designed to retain the very fresh sewage until it has been materially changed from the usual solid to more liquid form. Extensive studies show that a large part of the work done by these septic tanks is carried out in these so-called grit chambers. The other portion of the tank seems to be largely valuable for separating colloidal matter. So much stress is laid upon the latter that a large part of the analytical tables in the book have separate columns devoted to reduction of colloids.

Largely, we presume, on account of the peculiar and very strong character of sewage, the septic tanks generally provide for a period of detention some three days in length. Deposits seem to increase in depth very slowly. Although the author evidently favors provision for removal at intervals of a few months or a year, yet we infer from his statements regarding the operation of tanks that in many instances these latrine septic tanks in India have gone for five or six years without having the sludge removed from them.

Fortunately, the sludge from these septic tanks is, according to the author, almost absolutely inoffensive in character. This, of course, greatly simplifies the question of sewage disposal under the peculiar conditions which we have already described. Evidently the simplification just mentioned is not restricted to sludge disposal, for apparently a sludge so non-offensive as this would be accompanied by equally non-offensive effluent, although perhaps that is not necessarily the case.

Two chapters are devoted to "the study of the chemical action in the tank." Some of these studies were on exceedingly small scale, being limited to small bottles in laboratories, but the general results from the small-scale experiments seem to tally well with those based on analyses of sludge and effluents from actual installations.

A few pages are devoted to the optimum period of detention in the tank, which, as we have already stated, is long. Following this chapter is one on analyses of septic tank sludge and gases.

Contact beds and percolating filters are next taken up, with particular reference to their adaptability to the treatment of latrine-tank effluents. Consideration is given, however, to the possibility of treatment of sewage wholly by aerobic processes, or without tank treatment of any kind. The general conclusion reached by the author is that

> From the above points it may be concluded that, from a chemical point of view, the anaerobic and aerobic installations are equally efficient. That the objections to the aerobic installations under the head of difficulty of working, causation of nuisance and engineering considerations are extremely strong. The advantages in the shape of simplicity in working, the avoidance of nuisance, cheapness and freedom from serious disturbing influences are all on the side of the septic tank and filter.

This conclusion was based in part upon a study of the results obtained by a Dibden slate bed installed at Gouripore.

While we do not wish to make very much of the point, in view of possible controlling local conditions, it seems as though the author had not taken fully into consideration all the available data regarding the advisability of confining percolating filters by independent walls. His plans and sections show walls built up of the material composing the beds. The heavy batters of these walls result in a large amount of waste space, which does not comport well with the author's statements at another place to the general effect that it is often difficult and expensive to secure land for sewage-disposal works.

It often being difficult for local reasons to secure the installation of a regular sewerage system, the author describes a "dumping tank. This is nothing more nor less than designed to receive night soil brought the vicinity.

Other chapters deal with septic tanks drainage or sewerage systems, the final of tank effluents on land, into the sea, in and various classes of water courses, with the sterilization of effluents. For t purpose, chloride of lime is recommended, may be added is already used in India. of the fact that for one reason or anoth necessary in many sections to continue posal of night soil by burial in the grou though the author does not consider this sirable course where it can be avoided, scription is given of the laying out and ment of "trenching grounds." There is brief chapter on the incineration of night s companied by drawings in actual installat

We trust our outline of the contents book has justified our opening assertion ing its interesting character. With modifi suited to our own local conditions, some practices described might perhaps be ava for use in parts of the United States, partic the southern and southwestern parts. No fications whatever might be needed in so of the tropical lands recently brought under our control.

It may perhaps be noted that the septic tank described by the author, minus the latrine feature, is in some respects not so very different from many small sewage-disposal tanks built in this country for institutions and other large buildings or groups of buildings, except that much more diluting water is, of course, used here than in India. These Indian tanks may also be compared with the bacterial "macerating pit," described in an article on "A New Zealand Method of Sewage Disposal for Isolated Buildings" by Mr. John Mitchell, of Auckland, N. Z., in Engineering News for Oct. 31, 1907. We may add, for the benefit of those who wish to pursue further the subject of sewage disposal in oriental countries, that there appeared in our Engineering Literature Supplement for June 13, 1907, a review of a book by Mr. C. C. James entitled "Drainage Problems of the East." This review was written by Dr. Gilbert J. Fowler, of Manchester, England, whose name is mentioned above in one of our excerpts from the book now under review.

MACHINE SHOP PRIMER.—An Introduction to Machine Tools and Shop Appliances, with Illustrations, Names and Definitions. By Fred H. Colvin, A. S. M. E., Associate Editor of the "American Machinist"; Author of "Machine Shop Arithmetic," etc., and Frank A. Stanley, Associate Editor of the "American Machinist," Author of "Accurate Tool Work," etc. New York and London. McGraw-Hill Book Co. Cloth; 6¼ × 9¼ ins.; pp. 148; 424 illustrations. $1, net.

This is an illustrated dictionary of machine parts, machine tools, hand tools and other appliances found in machine shops. The preface intimates that the book is intended primarily for students and instructors in industrial schools.

The first section contains 508 sketches of machines, tools and machine-shop appliances. Each sketch is numbered. In Section II, are tabulated the names of the devices shown in Section I., correspondingly numbered. This arrangement makes it possible to test the student's knowledge of nomenclature. The third section gives concise definitions or bits of information about the articles shown in Section I., and a number of additional names and terms are included. Section III. contains also line cuts of the principal machine tools with the names of their parts indicated by means of reference numbers. An alphabetical arrangement is followed in all three sections.

The same cuts used in Section III. are used also in Section I., reference numbers and all, but without any explanation as to where to find the key to the reference numbers. There is nothing to indicate that these numbers do not refer, like the others in Section I., to the list of names in Section II. This feature, however, is the only apparent indication of shiftlessness in the preparation of the book.

The Effect of Light on Organisms.

Reviewed by GEORGE C. WHIPPLE,* M. Am. Soc. C. E.

LIGHT AND THE BEHAVIOR OF ORGANISMS.—By S. Mast, Associate Professor of Biology, John Hopkins University. New York: John Wiley & Sons. Cloth; 5¾ × 8¼ ins.; pp. 410; 35 illustrations in the text. $2.50, net; (10s. 6d.).

Anyone who has made a study of algae and other microscopic organisms with reference to their life history will find much to interest him in this book, but most of the matter is too technical for the ordinary engineer. It is a good compilation of existing data and contains the results of some new experiments. That light is an important influence in controlling the occurrence of microscopic organisms in water is an obvious deduction from the data presented, but whether the effect is a direct one or brought about indirectly through chemical action is by no means clear. Some of the experiments referred to are in line with common observation. Thus, diatoms are found to be most active in yellow, orange and red light. Euglena tend to congregate in light places and are especially attracted to the blue region of the spectrum. Diatoms become more active as the oxygen pressure in the water increases. Paramaecium, on the other hand, are more active in the dark and where the oxygen pressure is low, and it will be remembered that these organisms are commonly found in sewage and polluted waters.

The reading of the book impresses one with the fact that scientists really know very little about the effect of physical influences on microscopic organisms. It is a field well worth cultivating.

Further Researches on Water Storage and Pathogenic Germs.

THE COMPARATIVE VITALITY OF "UNCULTIVATED" AND "CULTIVATED" TYPHOID BACILLI IN ARTIFICIALLY INFECTED SAMPLES OF RAW WATER, WITH SPECIAL REFERENCE TO THE QUESTION OF STORAGE.—Sixth Report on Research Work. By Dr. A. C. Houston, Director of Water Examination. London, England: Metropolitan Water Board. Paper; 8 × 13 ins.; pp. 18.

Dr. Houston has added still another to his brilliant researches and reports on the reduction, and we might almost say the elimination, of pathogenic bacteria from city water-supplies by means of storage. His previous studies having been made with cultivated strains of bacilli, he gladly seized upon an opportunity to get nearer to actual water-pollution conditions by securing bacilli directly from a typhoid carrier. The interesting history of this carrier is outlined briefly in the report.† Briefly, the two series of experiments by Dr. Houston recounted in this report consisted (1) of placing many hundred thousand typhoid bacteria from urine from this carrier in 5,000 cc. of raw or unsettled Thames River water and making counts of the typhoid contents after various periods of storage. (2) The interest in the experiment is heightened by the fact that on the twenty-fourth day of storage of each of the two experiments Dr. Houston drank a half pint of the infected water and repeated the drinking on four succeeding days. In each case he thoroughly shook the bottle containing the infected water. He experienced no evil results in either case, although the original infected water contained nearly 220,000,000 typhoid bacteria to the half pint. Dr. Houston found that after the infected river water had stood for a week the 770,000 typhoid bacilli per cc. in the sample used in the first experiment had fallen to 4 per cc., giving a reduction of 99.9%. In the second experiment a bacterial reduction of 100% was found after the water had been stored a week. Subsequent cultures, with 1, 10 and 100 cc. samples after storage from 14 to 28 days in one of the experiments and 14 to 34 days in the other series, gave "negative results as regards isolation of the typhoid bacillus."

A third experiment with cultivated typhoid bacilli originating from the same carrier showed a bacterial reduction of 98.7% after one week's storage, and also gave positive results with 1-cc. samples up to five weeks of storage. After six weeks storage, "the typhoid bacillus could no longer be isolated even from 100 cc. of the infected water."

From these comparative experiments with uncultivated and cultivated typhoid bacteria, and from a large number of earlier experiments with cultivated strains, Dr. Houston concluded that

> Typhoid bacilli die much more speedily in raw river water than their "cultivated" brethren, and inasmuch as the danger of drinking polluted water is due to the possible presence of the former "uncultivated" bacilli, these observations are of far reaching practical importance.

The results of the experiments as outlined in this report deepen the conviction held for some time by Dr. Houston that the storage facilities of the Metropolitan Water Board should be materially increased, since, as expressed in his third research report:

> The use of stored water enables a *constant* check to be maintained on the safety of London's water, *antecedent* to, and irrespective of filtration.

Practical Astronomy.

Reviewed by HECTOR J. HUGHES,* M. Am. Soc. C. E.

TEXT-BOOK ON PRACTICAL ASTRONOMY.—By George L. Hosmer, Assistant Professor of Civil Engineering, Massachusetts Institute of Technology. First edition. New York: John Wiley & Sons. London, England: Chapman & Hall, Ltd. Cloth; 6 × 9¼ ins.; pp. 205; 78 text illustrations and 7 tables. $2, net; English price, 8s. 6d., net.

The teaching of astronomy to students of civil engineering is somewhat difficult. The time available for this subject in many institutions does not permit of a more extensive treatment than is given in the text-books on plane surveying; and this is not always sufficient to produce a thorough understanding even of all the simpler operations.

Mr. Hosmer's book treats of practical astronomy for engineering students with about the amount of detail and degree of thoroughness with which it should be taken up, if observations and reductions are to be understandingly, not mechanically, performed. The book is especially adapted for students who have studied surveying and know how to use surveying instruments and who have not time to take an advanced course in astronomy, and is written from the point of view of the engineering student who desires results.

The scope of the book and the method of treatment are on middle ground between the surveying text-book, which usually needs considerable supplementing, and the text-book on geodesy, which is too intricate for many students. In addition to its usefulness as a text-book for a separate course in astronomy, it will serve well as a reference book to supply the supplementary information which is usually needed in book form whenever astronomy is taught in connection with surveying.

The book deals chiefly with such observations as can be made with surveying instruments, but also treats briefly observations of a higher degree of precision. Unnecessary refinement is avoided; but in order to prevent misuse of short cuts, emphasis is placed upon an understanding of principles and a proper conception of the relative value of the different elements of the problems.

The matter is concisely and definitely handled; explanation is supplemented by many excellent diagrams and charts; such tables as are needed, or are useful for more than a short time, are given.

The book contains 14 chapters, a set of tables and an appendix. The subject matter is as follows: I. The celestial sphere; the real and apparent motions of the earth, the sun and the other planets. II. Points and circles of reference. III. and IV. Systems of coordinates on the celestial sphere; relation between coordinates and their relation to the observer. V. The several kinds of time, their relation to each other, to longitude; the measurement of time. VI. Explanation of the use of the American ephemeris and nautical almanac, and star catalogs. VIII. The figure of the earth; correction for parallax, for refraction, for semi-diameters of sun or moon, for dip. VIII. Attachments to the engineer's transit for astronomical observations; the sextant, the zenith telescope; observations. IX. The constellations, planets, and stars considered in practical astronomy. X. Observations for latitude on a circumpolar star; on the sun; on a southern star. XI. Observations to determine the time. XII. Observations for longitude. XIII. Observations for azimuth. XIV. Nautical astronomy; latitude, longitude and azimuth at sea; the position of a ship. Tables, and short appendix on tides and tidal observations.

MOTION STUDY.—A Method for Increasing the Efficiency of the Workman. By Frank B. Gilbreth, M. Am. Soc. M. E., with an Introduction by Robert Thurston Kent, Editor of "Industrial Engineering." New York: D. Van Nostrand Co. Cloth; 5¼ × 7¾ ins.; pp. 116; 44 text figures. $2, net.

Mr. Gilbreth's study of men and methods, in the endeavor to reduce the cost of building construction,* has caused him to see a tremendous loss of human labor and energy in all trades and professions. He has, therefore, come to the conclusion that in this field lies the greatest opportunity of conservation. He would have the government establish a permanent bureau with experiment stations to study, analyze and standardize all manner of trades—a United States Bureau of Standardization of Mechanical Trades.

The book itself is but a brief outline of what the author has accomplished with one trade and the effect that standardization of others is to have in doubling and tripling the output of labor. The illustrations and examples are drawn almost wholly from bricklaying, but from time to time we are told that the same study applied to other trades is going to revolutionize industry. There are but 116 pages of text, including the index, illustrated by reproductions from "Bricklaying System" and "Industrial Engineering."

The author takes up in order, the variables of the worker, such as anatomy, brawn, contentment, creed, etc.; the variables of the surroundings, such as appliances, clothes, color, entertainment, heating, etc., and the variables of the motion, such as acceleration, automaticity, combination with other motions, cost, direction, etc. There is much interesting matter and many easily recognized truths in these pages.

The object of motion study is to reduce to a minimum the number and length of the motions required to accomplish a desired result. This end is attained either by eliminating entirely unnecessary motions or by combining two or more into one; all this by arranging the materials and working outfit in the most convenient manner, by picking up and handling the material in the best ways, by the use of improved tools, etc.

The best arrangement, methods, etc., are to be found by observing the best workers, studying and analyzing their motions and reducing them by means of charts to the least possible number. Thus Mr. Gilbreth has reduced 18 motions in bricklaying to 4½.

All this is based on the assumption that man is a machine and as such may be perfected and systematized to any desired degree. This systematizing offers an unlimited field, for it is to include not only the mechanical trades, but even the wielding of the pen, since "the most offhand analysis of our written alphabet shows that it is full of absolutely useless strokes," it, too, must be made to conform to the laws of motion study.

Thus, in the opinion of our author, is motion study the greatest and grandest subject ever placed before scientific investigators. "The loss due to present classification of the trades alone," he says, "is probably more than sufficient to pension, under full pay, one-half the workers of the country." While under the classified, standardized, systematized conditions to be brought about by government experts, "the workers will be able to earn higher wages, when the unions see that they are benefited, and labor interests will cooperate, and the cost of living will be reduced as by no other means." If all this be true, a question which we leave to our readers, the troublesome problem which has been the subject of investigation by numerous state and national commissions, the reduction of the cost of living, is solved.

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†Complete details are given on pp. 105-17 of a recent annual report of the Local Government Board for Ireland (exact date not stated).

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*For reviews of the author's previous books, "Field System," "Concrete System" and "Bricklaying System" see this Supplement for Feb. 20, 1908; Dec. 17, 1908, and Dec. 16, 1909, respectively.

The Selection, Planting and Care of Trees for Shade and Embellishment.

THE CARE OF TREES IN LAWN, STREET AND PARK.—With a List of Trees and Shrubs for Decorative Use. By Bernard E. Fernow, Dean of the Faculty of Forestry, University of Toronto. New York: Henry Holt & Co. Cloth; 5¼ × 8 ins.; pp. 392; frontispiece and 115 illustrations in text. $2, net; $2.17, postpaid.

SHADE-TREES IN TOWNS AND CITIES.—Their Selection, Planting, and Care as Applied to the Art of Street Decoration; Their Diseases and Remedies; Their Municipal Control and Supervision. By William Solotaroff, B. S., Secretary and Superintendent of the Shade-Tree Commission, East Orange, N. J. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Cloth; 6 × 9¼ ins.; pp. 287; 45 plates and 35 text figures. $3, net.

The marked attention which has been given of late to shade trees in both public and private spaces of cities and towns receives new emphasis by the publication within a brief period of two important books. The earlier of these books by a few months is somewhat the broader of the two in scope in that it aims to cover the care of trees in private lawns, as well as in public streets and parks, and at the same time contains extensive descriptive lists of trees and shrubs for decorative purposes. The other volume deals more particularly with street trees, and, while it describes a few kinds of trees, it makes no pretense of taking up other than those which are particularly suitable or commonly used for street decoration and shade and does not attempt to describe even those in botanical detail. These omissions, however, are not wholly disadvantageous.

Mr. Fernow begins his book with an outline of the characteristics, structure and life of trees in general, and continues with a discussion of the diseases and death of trees, and of methods of diagnosing and controlling the diseases. Under the control of diseases and the general care of trees, he takes up such topics as soil improvement, fertilizing and pruning. A separate chapter is given to parasites and their control. This is followed by a brief chapter entitled "Care in Planting Trees," and this in turn by a short chapter on "Esthetic Forestry or Woodland Park Management." The body of the book is concluded with a chapter on "Care in the Choice of Plant Material," which, besides setting forth "general considerations," gives the lists of trees and shrubs already mentioned. These lists altogether occupy nearly 70 pages, including a classification of trees and shrubs suitable for such special purposes as color effect of bark, twigs and foliage; flowers and fruit; seasonal blossoming; and suitability to various types of soil and to the resistance of smoke. Appended to the volume is a bibliography of some 30 entries, and also what appears to be a good index.

A reasonable number of good half-tone views and a number of pen drawings help to give emphasis to the points which the author aims to bring out in the main text. There are also a considerable number of well-executed pen drawings showing the foliage, flower and fruit of many of the trees, but no drawings of the shrubs included in the descriptive lists.

Mr. Solotaroff approaches his subject quite differently than does Mr. Fernow. The former begins at once with the selection of trees for street use, first giving a word picture of an ideal street and outlining the various desirable qualities of street trees, and then taking up in succession the various species of trees suitable for planting. Numerous well-grouped plates of half-tone views are used to set forth the characteristics of the main species of trees described. The general plan of these plates is to show the street with its double line of trees, a relatively larger view of a single tree of the species represented and also twigs with (1) the winter buds, (2) the foliage and flowers and (3) the fruit and foliage of the tree.

After having given the reader a good general idea of the species of trees available for street planting and their main characteristics, the author discusses investigations that should be carried out before actual planting work begins. These include studies and preparation of the soil, and also the arrangement of trees on streets of different widths and characteristics. The next topic considered is tree planting. Here the author considers first the tree in the woods, then in the nursery, after which he notes the precautions which should be taken in planting the tree, such as heeling-in the stock, top and root pruning, etc. Next, stakes and guards for the regulation and protection of the tree, and ground-surface grills to insure a proper supply of air and moisture in case of trees planted in flagged or paved areas, are discussed. Shrub irrigation and drainage are also briefly treated here.

A number of chapters follow on the care of street trees, beginning with general care, such as watering, fertilizing, draining and pruning, and proceeding with measures to protect trees from various injuries, such as dust, smoke, illuminating gas, electrical wires and horses. The subjects of insects, fungus and other sources of damage to trees are next taken up, including such protective measures as insecticides, fungicides and spraying.

So far as the trees themselves are concerned, the volume may be said to conclude with chapters on preparing and replacing trees, but there are in addition three important chapters. The first of these aims to answer the question, who shall plant and care for street trees? The conclusion, of course, is for full municipal control of some carefully determined sort. The next chapter is entitled "A Department for Municipal Arboriculture." Here the author presents suggestions for tree census work, including field books for mapping and recording trees. He also discusses assessment lists for use when the cost of tree planting is placed upon the abutting property. The final chapter is a review, with actual quotations from laws, of tree legislation in the three states which lead in this matter, namely, New Jersey, Pennsylvania and Massachusetts. The chapter also contains a reprint of an ordinance governing shade trees on the public highways of East Orange, N. J., as passed by the Shade Tree Commission of that city. A useful index completes the volume. This index makes use of the asterisk to locate illustrations, when there is one relating to the particular item indexed.

Mention has already been made of the illustrations relating to the several species of trees discussed. It should be understood that many other illustrations are given and that some of these are also helpfully grouped. For instance, one of them shows, by means of a half dozen half-tones, the various steps followed in filling a large cavity in the base of an elm tree.

Either one of these volumes would prove to be eminently helpful to an official or a private property owner interested in the provision and care of trees for either streets, lawns or parks, and there would be distinct advantages in possessing both.

A New Year Book.

THE AMERICAN YEAR BOOK.—A Record of Events and Progress, 1910. Edited by S. N. D. North, L. L. D., under direction of a Supervisory Board representing national learned societies. New York and London: D. Appleton & Co. Cloth; 5¼ × 8 ins.; pp. 867. $3.50, net.

This Year Book is conceived on lines quite different from any heretofore attempted. Its distinction lies, first, in the fact that it is the result of official or unofficial cooperation of 32 learned and technical societies. Its second mark of distinction is a grouping of information under a few broad main heads, with the latter subdivided naturally instead of following the ordinary dictionary or alphabetical plan of arrangement. These two features combined result in making the Year Book a series of broad, general surveys of numerous fields of human activity and progress, while at the same time presenting, with proper correlation, a vast amount of detailed information. One of the chief disadvantages of the plan is a considerable amount of repetition, since each author feels it incumbent upon himself to present a fairly complete survey of his own particular field.

The Year Book falls into nine main parts: "Comparative Statistics," "History and Law," "Government and Administration," "Functions of Government," "Economic and Social Questions," "Industries and Occupations," "Science and Engineering," "The Humanities" and "Current Record." These in turn have from two to eight subdivisions, making in all 35 of the leading subdivisions. The various minor subheads, of course, go much further.

The general division, "Science and Engineering," is given 126 pages, of which 51 fall to engineering. Chemical Engineering is contributed by Mr. William M. Grosvenor, Consulting Engineer and Factory Engineer, New York; Civil Hydraulic Engineering is by Mr. Frank C. Nichols, of the editorial staff of Engineering News; Electrical Engineering is by Mr. Thomas Commerford Martin, formerly editor Electrical World and now Secretary of the National Electric Light Association; Mechanical Engineering is a joint production, somewhat oddly divided as follows: Automobiles, by Mr. Coker F. Clarkson, General Manager Society of Automobile Engineers; Aeronautics and Internal Combustion Engines, by Mr. Roger B. Whitman; Marine Architecture and Engineering, by Mr. Daniel H. Cox, and Machine Tools and Machine Design, by Mr. William Lodge, President of the Lodge & Shipley Machine Tool Co., Cincinnati, O. It should perhaps be explained at this point that Mining and Metallurgy, by Mr. Bradley Stoughton, Consulting Engineer, New York City, has been put under the main heading "Industries and Occupations."

While we cannot take space to go into details, it seems somewhat surprising that a review of mechanical engineering should be restricted to the few special fields just named, leaving others unmentioned, while under both civil and electric engineering we find a general review of what has recently been accomplished in a large number of both major and minor fields. This, of course, must be largely due to letting each contributor, or at least some of the contributors, follow their own ideas instead of a consistent detailed plan made by the Managing Editor or Board of Supervisory Editors.

As to the Supervisory Board just mentioned, this was composed, as has been stated, of official or unofficial representatives of a large number of national learned and technical societies of various kinds, numbering 32 in all. It is stated in the preface that this Board was composed of "regularly designated representatives or members" of these various societies, and that these members took part in preparing the volume "either by their own contributions, or by suggesting writers, or by supervising the work of such writers." We find in the list of societies thus represented all but one of the great national engineering societies. Strangely enough the omission is the oldest and by all odds the most important of the four, the American Society of Civil Engineers. One cannot but wonder whether this society refused or neglected to take a part in the Year Book, or whether by some chance it was overlooked.

The Year Book contains less than one would expect on a number of important questions directly relating to public health. The section entitled "Medicine and Hygiene" (21 pages), contains only a page on public health, of which half is devoted to the proposed national department of health and about a quarter page each to quarantine and cholera. Under chemistry and physics a page and a quarter appears on sanitary chemistry, which material was contributed by Mrs. Ellen H. Richards, of the Massachusetts Institute of Technology, and is about equally divided between ventilation, ultra-violet light and sterilization, the two last-named subjects having to do chiefly with water disinfection. Under civil and hydraulic engineering, some phases of sanitation are briefly considered, but altogether the volume seems to be sadly deficient in matters relating to public health and sanitation. This deficiency is made all the more notable by the space given to charities and correction and the labor legislation and state departments of labor, the latter being reviewed state by state. One might perhaps expect equal consideration for the work of state boards of health. Reference to the list of members of the Supervisory Board and of constituent societies discloses the fact that so old and important an organization as the American Public Health Association, like the American Society of Civil Engineers, is unrepresented in the list.

The adverse criticisms which we have made

as will be seen, are for the most part relatively minor and deal largely with various omissions and oversights, most or all of which might be expected in the first venture. Presumably they will be rectified in the later editions, which we are sure all who make use of this volume will welcome to see appear at regular intervals.

A Study of the Nature of Cement.

CHEMISTRY AND TESTING OF CEMENT.—By Cecil H. Desch, D. Sc. (Lond.), Ph. D (Wurzb.), Graham Young Lecturer in Metallurgical Chemistry in the University of Glasgow. New York: Longmans, Green & Co., London: Edward Arnold. Cloth; 5½ x 8¾ ins.; pp. 267; five plates, 19 text figures and 33 tables. $3, net.

The following paragraph from the preface of the book before us will explain in a few words the nature of this work and, perhaps also, its distinction from other books of a somewhat similar nature.

"The present work is written from the point of view of the chemist, and mechanical processes are only so far described as is necessary to render the account of the manufacture (of cement) intelligible. References are given to larger works in which the engineering aspect of the industry may be studied. The attempt has likewise been made to explain the nature of the chemical compounds contained in cements, the reactions involved in their preparation from the raw materials, the changes which take place during setting and hardening, and the methods of controlling the quality of the product. The author has sought to present as fairly as possible the results of modern research, passing over the older loose and inaccurate views which are still frequently reproduced in many works of reference.

Possibly no other material so widely used as calcareous cement is so little understood. Most engineers have a fairly clear idea of the methods of manufacture and of the constituent parts of the raw material but their knowledge of the chemistry underlying either its manufacture or its setting is of the vaguest. This is not to be wondered at considering the very vague notions the chemists and the cement makers themselves have of the nature and behavior of their product. It has only been in the past decade that the growing science of physical chemistry has combined its research with the older pure chemistry to clear up some of the underlying fallacies in the old theory of cements and even now the sum total of knowledge about it is very meager. With the advanced methods of research now being pursued in several laboratories we can hope in the not too remote future to have a basis of theory which may quite probably appreciably affect the future manufacture of cement and improve the quality of the material engineers use.

Meanwhile it is desirable that the present state of knowledge be set down as clearly as possible, and this has been very fully done by Dr. Desch.

The preliminary chapter is a historical one, somewhat different from similar chapters in analogous books, because it discusses the chemical makeup of the earlier cements and limes and traces slightly the development of the study of cement chemistry. The second chapter is a standard discussion of the raw materials and the processes of making various types of cements. The third chapter takes up in detail the chemical components that go to make up cements, treating each compound separately and discussing its physical and chemical nature. Here the latest developments in the study of the calcium-aluminum-silica compounds are set down.

Chapter IV. is devoted to the constitution of cements, with special attention to a microscopical study of thin slides of hardened cements and cement mortars. Chapter V. is on the setting and hardening of cements. Chapters VI. and VII. take up the physical nature of cements, mortars and concretes, and include all the material on the testing of cements which gives the book a portion of its title, Chapter VIII, the various distinctive agencies that affect hardened mortars or concretes and the final Chapter IX, the question of Chemical analysis to determine the composition of a finished cement. Appended is the Revised British Standard Specifications for Cement.

The portions of the book devoted to concrete, as a material for the engineer's use, are not of any great value. Quite evidently they are not from the author's own knowledge, but are mere restatements of what other men have said. On the other hand the original purpose of the author has been remarkably well carried out. The insistence throughout that cement must be regarded as a metallurgical problem, similar to an alloy, rather than as a chemical combination, is of course in line with accepted theory to-day, but it serves to clarify considerably what can never be a very clear matter, especially to the layman or even the engineer. Primarily the book is intended for cement chemists, but very conceivably the engineer who is interested in cement or in concrete could get much of interest and value to him out of it. Especially good are the sections on the effect of sea-water, alkali, sewage and other deleterious matter on hardened concrete.

An Electrical Manual for German Builders.

Reviewed by HENRY H. NORRIS.*

ELEKTROTECHNISCHE WINKE FUER ARCHITEKTEN UND HAUSBESITZER.—By Dr.-Ing. L. Bloch und R. Zaudy. Berlin, Germany: Julius Springer. Cloth; 5½ x 8¼ ins.; pp. 151; 90 text figures. 2.8 marks; American price, $1.20.

The authors have gathered into a convenient little reference manual a collection of useful and practical hints about electrical apparatus for the information of architects, builders and others concerned with modern building operations. The hints are evidently based upon close observation of modern practice, for many of the devices described are of very recent origin. While much of the apparatus described is of German manufacture, the illustrations indicate that there is no substantial difference, in appearance or method of application from similar installations in this country.

The first chapter is devoted to the installation of electrical conductors in modern and older buildings. Particular attention is paid to conduit wiring in concrete buildings where the tubes are preferably either buried in the concrete or attached to blocks molded in the concrete. Methods of attaching conduits to concrete walls and ceilings are also explained and illustrated. Photographs are reproduced to show the work of putting in the electrical conduits, or means for supporting them, at the proper stage of the building operations. These suggestions should be helpful to architects and builders who can secure the best results by cooperation in this matter with the electrical engineers and contractors.

Electric lighting naturally occupies a large part of the space in the book, and after a general introduction various types of arc and incandescent lamps are described. The illustrations and descriptions are intended to give a general idea of the value and field of application of each lamp without going into great detail. Some useful tables and diagrams are given to show at a glance the relations of voltage, efficiency, candle power and power consumption of different lamps. Following these are some simple studies in illumination. Arrangement of light sources for general effectiveness, and in some cases for artistic appearance, is given careful attention. The illustrations in this section are especially interesting as they show well-illuminated rooms in residences and restaurants, as well as store windows, a post-office sorting room, etc. Indirect lighting by incandescent and arc lamps, a recent development in illuminating engineering, is not forgotten.

Short chapters are devoted to electrical heating and cooking, to the applications of the electric motor for elevators, ventilation and general domestic purposes, and to the use of electrical power in building operations.

THE INDICATOR HANDBOOK: A PRACTICAL MANUAL FOR BEGINNERS.—Part I.—The Indicator: Its Construction and Application. By Charles N. Pickworth, Whitworth Scholar; Editor of "The Mechanical World"; Author of "The Indicator Diagram: Its Analysis and Calculation," "The Slide Rule," etc. Fourth edition, revised and enlarged. New York: D. Van Nostrand Co. London: Whittaker & Co. Cloth; 5 x 7½ ins.; pp. 142; 93 illustrations in text. $1.50, net; English price, 3s., net.

The changes made in this edition from the third edition consist chiefly in revision and additions in the matter describing the various types of indicators. A separate chapter has been added containing descriptions of gas and oil-engine indicators.

A review of the third edition was published in Eng. News, June 14, 1906, p. 674.

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A Non-Technical View of Railway Management.

RAILROAD ADMINISTRATION.—By Ray Morris, M. A., Managing Editor of the "Railway Age Gazette," 1903-1910. New York and London: D. Appleton & Co. Cloth; 5¼ x 8½ ins.; pp. 309; 27 tables. $2, net.

The amount of recent public discussion respecting railway management and the extent to which it is or is not efficiently administering the business of transportation makes this book especially worthy of attention at the present time. It is, however, a book of permanent usefulness, not only in railway circles but beyond them. The science of organization is only beginning to be a science. Only a very few among the "captains of industry" and the men who have control of large enterprises or the administration of public affairs have given any special attention to the merits of different schemes of organization, or the methods by which they may be adapted to different conditions.

It is, of course, true that efficient work is impossible with any form of organization if it is conducted by inefficient men. It is also true that in very many cases good men are prevented from doing good work by the red tape or faulty organization which fetters their movements.

An idea of the scope of the book before us may be gleaned from the titles to some of the chapters: I. "The Beginning of a Railroad" (relating to the organization during construction.) II. and III. "Organizations Required for Small and Few Large Railways." IV. "Divisional vs. Departmental Organization." V. "The Officers." VI. "British Railroad Organization." VII. "Types of Government Railroad Organization." VIII. "Railroad Financial Organization." IX. "The Public Relations of a Railroad." X. "Control Through Statistics." XI. "Tendencies of Railroad Development."

We would particularly commend this book to young men in the railway service who are ambitious and desirous of understanding the whole machine of which they are a part. It is written throughout in non-technical language, and we may add also in excellent English.

Its author rendered valuable service to the railway industry during the years in which he conducted the "Railway Age Gazette," and his work on this volume is a valuable contribution to the meager literature dealing with systems of organization.

STATE DRAINAGE WORK IN MINNESOTA, Aug. 1, 1908-10. WATER RESOURCES INVESTIGATION OF MINNESOTA, 1909-10.—Reports by the State Drainage Commission. St. Paul, Minn.: Pub. Docs. Paper; 6 x 9 ins.; pp. 125 and 347, respectively; maps and illustrations.

A considerable amount of drainage work is being carried out under the direction of this Commission. The report on its activities in this field contains summaries of the work accomplished and under way, including a considerable number of tabular statements. The report also contains general information on the subject of drainage work, including something on hydraulics.

A study of the water resources of Minnesota was recently entrusted to the State Drainage Commission, and has been carried out in conjunction with the U. S. Geological Survey. The volume dealing with these investigations contains (1) a general statement of the origin and scope of the investigations by Mr. Geo. A. Ralph, Chief Engineer of the Commission, in connection with which a general review of more or less similar investigations in other states is given. This occupies 55 pages and is followed (2) by a report by Mr. Robert Follansbee, District Engineer, U. S. Geological Survey, which occupies the rest of the volume. Mr. Follansbee's report contains a large amount of stream-flow data from Minnesota, many of which are evidently taken from the papers and records of the Water Resources Branch of the U. S. Geological Survey, since for many streams the records cover a large number of years. The report also gives many other data relating to streams in Minnesota. One section of the report relates specifically to water power. Numerous river profiles are given, and also a number of handsome reproductions of photographs.

Electric Railway Transportation Problems.

ELECTRIC RAILWAY TRANSPORTATION.—The Annals of the American Academy of Political and Social Science, 1911. Vol. XXXVII. Emory R. Johnson, Editor. Philadelphia, Pa.: The Academy. Paper; 7 × 10 ins.; pp. 244; illustrated. $6 per year; $1 per copy.

This number of the annals of the American Academy of Political and Social Science is divided into two parts; one dealing with problems of finance and traffic, the other relating to public regulation of electric railways.

The first division contains twelve papers, and the second five papers. For the most part these papers are broad discussions of public policy or of applications of recognized principles, and are written by men who have been prominently identified with the particular features discussed in their respective papers. Mr. B. J. Arnold contributes a general discussion of city transportation problems, this paper being one chapter of a report recently prepared for the city of Pittsburg and reprinted in our issue of Feb. 9, 1911. The problems of depreciation are outlined by Mr. W. B. Jackson, of Chicago, with special reference to street-railway work. Mr. Williston Fish, Assistant to the President of the Chicago Railways Co., discusses methods of increasing the efficiency of surface lines in large cities, and of somewhat similar interest is the investigation of traffic possibilities of proposed subway lines by Mr. W. S. Twining, of Ford, Bacon & Davis, New York City. Freight and express business is discussed by Mr. Frank S. Cummings, Traffic Manager of the Interurban Ry., Des Moines, Ia., and Mr. A. Eastman, General Manager of the Windsor, Essex & Lake Shore Ry., Kingsville, Ont. Mr. S. M. Curwen, General Manager of the J. G. Brill Co., Philadelphia, in a paper "Economic Factors in the Selection of Cars for Urban Service" shows the advantages and disadvantages of some of the types of street-railway cars commonly seen in larger cities. The relations of the company and its employees are taken up in two papers; one by Mr. C. D. Emmons, General Manager of the Fort Wayne & Wabash Valley Co., Fort Wayne, Ind., and Mr. D. T. Pierce, former Executive Assistant of the Philadelphia Rapid Transit Co. Suggestions for acquainting the public with the problems which a street-railway management meets are given by Mr. A. W. Warnock, General Passenger Agent of the Twin City Rapid Transit Co., Minneapolis and St. Paul, and by Mr. A. D. B. Van Zandt, Pub. Agt. of the Detroit United Rys.

In the second part of the volume, Mr. F. R. Ford, of Ford, Bacon & Davis, New York City, has given a brief general review of past work in the evaluation of properties, and to this he has appended an inventory of work and expense items of intangible property of the Coney Island & Brooklyn Ry. Co., on the evaluation of which line Mr. Ford was engaged for some time. This paper is followed by "The Indeterminate Permit as a Satisfactory Franchise" by Mr. William Osgood Morgan, Vice-President and Counsel of the Sheboygan Ry. & Electric Co., Wisconsin. This is an almost unqualified approval of the Wisconsin public service law and of the indeterminate form of franchise which has been found beneficial in reorganizing the public utilities of that state. Hon. B. H. Meyer, Member of the Interstate Commerce Commission and formerly Chairman of the Wisconsin Railroad Commission, has contributed a paper "State Supervision of Electric Railways in Wisconsin." Prof. Meyer here first states what power the Commission claims to have, and then relates the general points in the investigation of the service furnished by the Milwaukee Electric Ry. & Light Co., which perhaps is the most important street-railway case in which the Commission has acted. Hon. M. R. Maltbie, Member of the Public Service Commission of New York, First District, has contributed a somewhat similar paper outlining the powers and duties of the commission of which he is a member. The work of the Commission in forcing the installation of safety devices and in improving service on the metropolitan lines is very generally considered. Among the more important points discussed may be noted the Commission's study of street-car fares and transfers, approval of securities, and provision for added rapid-transit facilities. The final paper of the section is "Supervising Engineers and Street Railway Service" by Mr. George Weston, Assistant Chief Engineer, Board of Supervising Engineers, Chicago Traction. This paper is an outline of the developments which led up to the appointment of the Board of Supervising Engineers in 1907 and of their work in securing efficient street-railway service with adequate return to the owners.

The papers in this volume are written in a style and on a plane which should be greatly appreciated. There is a possible exception in the paper "The Decreasing Financial Returns Upon Urban Street Railway Properties" by Dr. Thomas Conway, Jr., of the Wharton School of Finance and Commerce, University of Pennsylvania. There are many points in this paper which will lead the careful reader to believe that Dr. Conway has written rather hastily and has not carefully weighed his material in drawing his conclusions, and that, possibly on this account, his statements are somewhat warped to unduly favor the traction companies generally.

Neglecting very minor points which may be criticised, there are still certain matters which might have been more carefully considered. For instance, there is a great tendency to quote decimals of a cent which is available for profit, etc., instead of always noting what percentage the earnings are of gross receipts, of operating expense and of similar items which lead to a more intelligent understanding of the ways in which decreased return should be judged.

At many points, Dr. Conway attacks the common transfer system. He states that the financial embarrassment of the New York street-railway lines was largely the result of a heavy decline in the average rate of fare through the operation of the transfer system. This statement is to be contrasted with the one made by Mr. Maltbie that the trouble is to be charged against decades of high finance, in which leases, bond and stock issues and dividend guaranties had been piled up like a pyramid on its apex. Dr. Conway nowhere discusses the conditions back of transfer troubles,—such as haphazard routes and inadequate economical carriage limits. This lack is noticeable when Dr. Conway recommends that the entire transfer system should be reorganized,

that the rate of fare per single ride should be reduced to 4 cts. and that those desiring a transfer should pay an additional cent.

Following such a scheme, it seems as though the railways would get only 4 cts. from some passengers and 5 cts. from a few others, whereas at present they get 5 cts. from every one of these passengers paying any cash at all. Perhaps the best idea of the inadequacy of the treatment of some such points comes from a direct comparison with Mr. Arnold's discussion of city transportation problems.

STATISTICS OF CITIES HAVING A POPULATION OF OVER 30,000: 1908.—Special Reports of the Department of Commerce and Labor, Bureau of the Census; E. Dana Durand, Director. Washington, D. C.: Pub. Doc. Cloth; 9¼ × 11⅝ ins.; pp. 353.

A large collection of financial statistics of cities for the year 1908 is here presented. The bulk of the report consists of general tables. These are preceded by an introductory text consisting, first, of a few general statements; second, of a brief survey of accounting terminology; and third, a description of the general tables, in which is embodied a large number of summary tables. In general, it may be said that the statistics given include payments, receipts, indebtedness and rates of interest for the various cities for the year 1908. These figures are classified by sources of receipts and objects of expenditure. The valuations of properties employed for various specified purposes at the close of the year are given, and also the replacement value of public improvements, assessed valuations of property in general, basis of assessment and taxes levied. Some of the figures are presented on a capital basis. The report as a whole shows an improvement over earlier ones, and at the same time lays emphasis on the need of more attention being given by the municipalities themselves to improved systems of accounting.

How to Make Use of Statistics

AN ELEMENTARY MANUAL OF STATISTICS. By Arthur L. Bowley, M. A., F. S. S.; Reader in Statistics in the University of London; Author of "Elements of Statistics," "National Progress and Welfare," Etc. London: Macdonald & Evans. Cloth; 5¾ × 8¾ ins.; pp. 215; six diagrams in text. 5s. net.

Many engineers have occasion to compile statistics, and nearly all have to make frequent use of them. So far as we know, neither the compilation nor the use of statistics is commonly taught in engineering schools, though, of course, nearly every engineering student of to-day has some instruction which bears upon the subject. The book before us contains much that would be suggestive and perhaps valuable to the engineer, although it is written for the general student of the subject and is, as its title states, elementary in character.

The volume is divided into two parts: the first one deals with principles, presented chiefly by way of concrete examples; the second part continues the study by drawing largely upon a number of different classes of British statistics. In Part I. a few definitions and warnings are given by way of introduction. The author then takes up accuracy and approximation, averages and their accuracy, diagrams, tabulation, sampling, rules for using statistics and methods of statistical analysis.

The specific British statistics chosen for illustration and discussion in Part II. relate to population, vital statistics, trade and transportation, prices, production, wages, employment, income and capital and taxation.

Besides the worked examples scattered through the text, a number of exercises supplementary to the various chapters are presented in an appendix. There is also a brief bibliography, consisting, however, almost wholly of references to British Government publications. The index is so short as to throw some question upon its completeness, but it may be that it is ample for its purposes.

Only elementary mathematics are involved in the book, and for the most part these are of the simplest character. A reading of the volume could hardly fail to interest any engineer who could find the time to give to it, and would doubtless prove to be of material advantage to any engineer engaged in statistical work who is not either a born or well-trained statistician.

New Popular Priced Hand Books.

HEAT.—By J. Ogden Gordon, Ph. D., Professor of Physics and Chemistry, Fifth Avenue High School, Pittsburg. Chicago, Ill.: Popular Mechanics Co. Cloth; 4¼ × 7 ins.; pp. 119; numerous illustrations in text. 25 cts., net.

ARTS-CRAFTS LAMPS.—How to Make Them. By John D. Adams. Chicago, Ill.: Popular Mechanics Co. Cloth; 4¾ × 7 ins.; pp. 87; illustrated. 25 cts., net.

These two volumes ("handy books" perhaps would be a better description than "hand books") have been well printed and well bound and will probably attract the non-technical reader who has some taste for scientific or mechanical subjects.

It is therefore disappointing that the author of the first volume has tread the path so often followed by "popular" writers with the result of confirming some common misapprehension. The trouble lies in the more general statements in the introductory remarks at the opening of chapters. It seems to be an impression that vivid adjectives and flowing language are necessary to interest the lay mind. Comprehensiveness and generality have been confused with inexactness and inaccuracy. If these parts could be blotted out, the descriptions of thermal phenomena and the explanation of their relation to commercial processes would be found satisfactory.

The second book, perhaps, may not be called scientific, but it is more interesting and useful than the first. Perhaps this is on account of its freedom from an attempt to popularize science. It gives drawings for table lamps, drop lights, chandeliers, bracket lamps, etc., to be constructed from wood, cardboard, and colored paper. There are, accompanying the drawings, simple directions for manipulating the materials.

A Popular Book on English Railways.

OUR RAILWAYS. How They Began and How They Are Worked.—By W. J. Gordon, Author of "Every-day Life on the Railroad," "Foundry, Forge and Factory," etc. In two volumes. New York and London: Frederick Warne & Co. Cloth; 6 × 8¾ ins.; pp. 268 and 248; 36 plates (colored) and 320 other graphic illustrations. Bound in cloth, $4.50 per set; English price, 12s.; post free, 12s. 6d. Half calf, $7.50 per set, net; 20s.; post free, 21s.

The railway has always been a great attraction to the general public, and a popular book on railway and railway work is sure of appreciative readers. England is the home of the railway, and perhaps for this reason England has been much more prolific than America in this class of literature. The book under review is a good example of its class. It is historical, technical and descriptive, but popular in style. It discusses in intimate manner the development of nearly a score of the leading railways, from their inception to the present day, and presents much of "human interest." It deals with the history and difficulties of railways, their engineering works and other features of interest, their ancient and modern locomotives and rolling stock, their traffic conditions, their notable trains and train service, their signaling and terminals, their docks and steamer service, and numerous other matters. And all this information is presented in most interesting and readable style. There are plenty of figures, to be sure, but they are given incidentally and with no attempt at complete records or comparative statistics. Special claim is made for accuracy of statements, the chapters having been submitted to the respective railways for approval.

We cannot imagine any "railway man" (in whatever department) taking up this book without becoming so deeply interested as to be inclined to neglect other matters until he has read it to the end. To the American reader many of the features will at first seem peculiar, owing to the different conditions of the two countries. But he soon finds that the experiences have a very familiar air, after all. The controversies, internecine wars, financial and traffic problems, construction difficulties, developments in equipment, etc., are very much the same in kind (though differing in degree) in all countries.

The book gives no general history of the British railway system or British railway engineering. Each chapter deals with one individual road, and is quite independent of the rest of the book. Thus the high points in railway history and the various interesting facts or occurrences relative to particular subjects are not grouped according to character, but are referred to in connection with the different roads to which they relate. For instance, in the chapter on the Great Western Railway we find particulars of the "battle of the gages" (between the now standard 4 ft. 8½ ins. and the now obsolete 7 ft. gages), while in other chapters we find interesting notes of various other widths of gage. In one case, the engineer of a line forming a connecting link between the ends of two lines of standard gage insisted on adopting a gage of 4 ft. 9 ins., and through trains had to be run over both gages. On a small scale and for a short time, therefore, England had the conditions which obtained later in this country when the Pennsylvania Railroad persisted in using a gage of 4 ft. 9 ins. England also had the mixed gage or three-rail track on certain lines; an example followed in this country in adapting to standard-gage traffic the broad-gage of the Atlantic & Western Railway (Erie) and the narrow gage of the Denver & Rio Grande Railroad.

Physical pitched battles between the employees of different railways at disputed crossings or connections are usually considered as being peculiarly American or "western" features of railway affairs. Doubtless this is the case so far as modern conditions are concerned, but English railway history has its records of such occurrences. One case mentioned involved a four-sided controversy. Two practically parallel railways had a sort of "gentlemen's agreement" as to non-invasion of each other's territory. An independent company built a connecting line, which it expected the older lines to operate. Both declined on account of the agreement, and a third line also declined an invitation to invade the proscribed territory. The new company then proposed to operate independently. This "stirred up the animals" with a vengeance, for while none of the old lines wanted to precipitate competition with its neighbors all were agreed in objecting to a newcomer opening general competition. Finally one company agreed to risk operation of the new line, and its first train (manned by a gang of laborers) found an engine chained to the tracks at the connection with the rival line. A fight resulted, in which one party succeeded in removing the obstruction, while the other party succeeded in tearing up the rails so as to leave the train marooned. Fortunately, firearms do not play a part in such affairs in England, and no great damage seems to have been done. The companies then turned to the less spectacular but more decisive (and more expensive) process of legal fighting. Other similar instances are recorded, as where a train of locomotives pushed an invading engine into a shed to prevent its handling the train.

So much attention is given to historical developments that it is strange to find a very important consolidation of recent years (1899) simply mentioned as having occurred. We refer to the South Eastern Railway and the London, Chatham & Dover Railway, which served the same territory and were deadly enemies for some 50 years. Their final consolidation (as the South Eastern & Chatham Railway) was a notable event but nothing is said as to the prolonged negotiations or the terms of the agreement. In still more recent years some connecting (not parallel or competitive) lines have sought to consolidate, but have failed to receive the necessary permission from the government. An interesting note in regard to time-tables is that a certain schoolmaster introduced these as a study, and gave his pupils problems in cross routes and connections as a good exercise in mental gymnastics.

Considerable attention is given to the development and performance of the locomotives on the several lines. This is a feature of English books of this kind, and indicates a general popular interest in the subject. The illustrations include many of the "old-timers," the ordinary engines of 10 and 20 years ago, and the large engines which have been introduced in very recent years to handle the increasingly heavy fast passenger trains and freight trains. The weight of passenger trains has increased enormously owing to the introduction of more elaborate cars and the provision of dining, parlor and sleeping cars, etc. Compound locomotives have been tried on several roads, but are used only to a very limited extent. Simple engines with three and four cylinders have been introduced in recent years. An interesting modern engine of this sort is a three-cylinder simple tank engine of the 0-10-0 class designed to offset a demand for electrifying a congested suburban service of the Great Eastern Ry. by showing that rapid acceleration could be effected with steam as well as with electric traction. It is stated that in starting with a 315-ton train a speed of 30 m. p. h. could be attained in 30 secs., but the engine proved to be too heavy for several of the bridges. A noticeable feature of English engines is the large size of their truck and trailing wheels; this matter we discussed some years ago.

The passenger cars range from ancient open "wagons" for the despised third-class passengers and from Queen Victoria's private car of 1840 to "royal" trains of modern 70-ft. cars, and to the modern corridor cars, sleepers (first used in 1873), diners, etc., for the general public. Some of the roads use Pullman cars, but most of the special cars are of English design and construction. Many of the sleeping cars are superior to the Pullman type in comfort, convenience and privacy. These are of the corridor type, with separate sleeping compartments, each compartment having its own lavatory accommodation instead of turning the smoking room into a general dressing room. Compartment sleeping cars are quite exceptional in American railway service. Some English cars for local traffic now have the seats formed of thin sheets of wood bent to shape and perforated for decoration. This has long been common in America (particularly for street cars). During a visit to England 20 years ago the writer of this review suggested to an English manager the use of this style of seat for local cars, as being cheaper and more sanitary than upholstery. He was told that its use would be impossible, as michievous passengers would promptly ruin the seats by cutting them between the perforations. It would appear that the fears were not well grounded, or that the mischievous propensities of passengers have abated.

The "race to the north" of rival routes was a highly interesting and spectacular series of events. In 1888, the time between London and Edinburg was reduced from 10 hours to 7½ hours; in 1895 the longer run to Aberdeen was reduced from 11½ hours to 8½ hours. The length of non-stop passenger runs is increasing; at present the longest is the run from London to Plymouth (Great Western Ry.), 226 miles in 247 mins.

Excursion trains (with special low fares) date from 1840 (Midland Railway), and in 1841 the late Thomas Cook (of tourist traffic fame) ran his first excursion: "hiring the train at his own risk, selling the tickets himself, and traveling with the excursionists to look after their comfort." The lighting of cars by electricity and compressed oil-gas is now general, but of the old oil lamps it is said that "the smell was in many cases more noticeable than the light."

Engineering works, difficulties and achievements receive a good share of attention. In the early 40's a tunnel in sliding ground was lined with iron ribs to resist the pressure; in another case, swelling clay forced the mortar from between the bricks and the difficulty was overcome by laying the bricks in quick-setting "Roman cement." And there is the tunnel under the River Severn, which was flooded three times during its construction; this is the longest tunnel in England, 4½ miles. Many notable bridge and masonry viaducts are mentioned, with notes of difficulties in their construction. Plenty of difficulties were encountered also in the construction of the roadbed. Swamps and peat bogs had to be crossed and the engineers seem to have encountered troubles in succession. Even climatic difficulties helped to "make things interesting." The Midland extension from Settle to Carlisle (72 miles) crossed a wild country where snow was sometimes 7 ft. deep, rains reduced the working days to two or three per week, and high winds prevented the bricklayers (on the viaducts) from working on their scaffolds. We find that Braithwaite introduced the American locomotive pile driver and steam shovel on some of his work (about 1840 apparently). That English railways are far from being behindhand in the use of modern appliances is indicated by the use of a telferage system for handling baggage in the Victoria station at Manchester.

The illustrations include many interesting and well-printed half-tone engravings of locomotives, cars, bridges, trains running at full speed, stations, shops, steamers, and bits of scenery. Only a few of them are referred to in the text, but they add greatly to the interest of the book, and give a better idea of English railways and railway works than could be conveyed by pages of descriptive matter. Colored engravings of locomotives and passenger cars show the color schemes adopted by the various railways, and it will interest American readers to see these green, blue, red, brown and black locomotives. The colored plates have certain defects, however; on the one hand, the wheels, frames, springs, etc., are left wholly or partly uncolored; on the other hand, an endeavor is made to show the decorative lining, striping and panelling in its exactitude, which results in very much exaggerating the scale of these decorative details. The result is to give a gaudy and circus-wagon appearance to the engines which they do not possess in reality. Much better examples of color printing are afforded by the plates showing the armorial bearings of the different railway companies, which are composed largely of the arms of the principal cities on their lines. These are printed in flat color and are rendered in excellent style. The book is printed in first-class manner on a quality of paper which shows the numerous half-tone engravings to advantage.

British Building Construction.

BUILDING CONSTRUCTION.—By Beresford Pite, F. R. I. B. A., Professor of Architecture, College of Art; Frank T. Baggallay, F. R. I. B. A.; H. D. Searles-Wood, F. R. I. B. A., and E. Sprague, Assoc. M. Inst. C. E. Edited by F. M. Simpson, F. R. I. B. A., Professor of Architecture in the University of London. In two volumes. Vol. I. New York and London: Longmans, Green & Co. Cloth; 5¾ × 9¼ ins.; pp. 432; 249 text illustrations. $5, net; English price, 18s., net.

Though not so specifically stated on the title page, it appears that this book is one of a series of works on architecture, which are to be published under the title "The Architects' Library" and under the editorship of Mr. F. M. Simpson, F. R. I. B. A. Already there has appeared a three-volume "History of Architectural Development," and it is noted that the "Building Construction" before us will be in two volumes, the first of which only has reached us. No prospectus accompanies the volume to indicate the extent to which the library will be continued.

The first volume of the "Building Construction" takes up, successively, brickwork, masonry, carpentry, metal construction and graphical and analytical mechanics insofar as they relate to structures. As indicated by the previous paragraph, the treatment throughout is entirely from an architect's standpoint. Indeed, the following extract from the preface expresses the real idea of the authors:

> Existing books on building construction are in most cases excellent in some respects, but too often fail to place before students the treatment which is necessary if buildings are to be not only sound, but also architecturally satisfying.

Within the limits set by this standard, the chapters on methods and materials are quite satisfactory, though of small value to the building engineer. Certainly, there is very little not covered in existing engineering works, though the well-known more graceful literary style of the architect always makes his technical works more pleasant reading. The chapters on the mathematics of design are quite inadequate, unless the reader is fairly well acquainted already with mathematical processes.

The book is distinctly British, in nomenclature and in subject matter. At random we have selected a few words from its pages; they show the difference between the British and the American language. The words are: King-closer, waller, withe, hewer, stugged, scabbled, muckle, knapped, stunning, boning, galleted. How many American architects or engineers know what they mean?

DENUDATION AND EROSION IN THE SOUTHERN APPALACHIAN REGION AND THE MONONGAHELA BASIN.—By Leonidas Chalmers Glenn. Professional Paper 72, U. S. Geological Survey; Geo. Otis Smith, Director. Washington, D. C.: Pub. Doc. Paper; 9 × 11½ ins.; pp. 137; 21 plates and one text figure (map).

An extensive study of the damaging effects of denudation and erosion in the central eastern and south eastern portion of the United States is given in this volume. The general subject of erosion, with particular reference to the district under review, is treated in the first thirty pages of the volume, after which the Tennessee, French Broad, Chattahoochee, Broad, Catawba, Monongahela, and other river basins are taken up in more or less detail. Maps and numerous half-tones are included.

THE SCIENTIFIC AMERICAN CYCLOPEDIA OF FORMULAS.—Partly Based upon the 28th Edition of "Scientific American Cyclopedia of Receipts, Notes and Queries." Edited by Albert A. Hopkins, Query Editor of the "Scientific American." New York: Munn & Co., Inc. Cloth; 6 × 9 ins.; pp. 1,077; illustrated. $5, net.

About 15,000 formulas for the mixing of various compounds useful in the arts and sciences are included in this latest revised abstract of the old "Scientific American Cyclopedia of Receipts, Notes and Queries." Aside from the general items of interest, the engineer will be specially concerned with the chapters on alloys and amalgams, paints, varnishes and lacquers, waterproofing and fireproofing, coating of metals, and heat treatment of metals. He may have a purely amateur interest in the chapters on Beverages and Ice Cream, Confectionery and Chewing Gum.

Navigating the Air.

HOW IT FLIES; OR, THE CONQUEST OF THE AIR.—The Story of Man's Endeavors to Fly and of the Inventions by Which He Has Succeeded. By Richard Ferris, B. S., C. E. New York: Thomas Nelson & Sons. Cloth; 5 × 7½ ins.; pp. 475; 150 illustrations in text. $1.20, net.

Here is one of the most interestingly written reviews of the history and art of navigating the air that has been published. As one would infer from the title, it is for the general reader, with little or no technical training. The selection of material has been judicious and the balance of parts in the book suggests the actual importance of the several developments with which the public has become more or less familiar.

So much has been written, discussing aerial navigation from so many viewpoints, that this book cannot hope to appear novel to one acquainted with the art. The explanations of theory are necessarily very elementary indeed so that they can not particularly appeal to one who has a good knowledge of mechanics, and physics generally.

There is a lack of specific references to the great number of sources of information, direct or indirect. There is also no index. These omissions perhaps merely set the book off as a popular rather than a technical treatise. There is one other feature seen, which unfortunately has marked too many otherwise good "popular" books. That is the frequent inaccuracy of statement; so widespread has been this fault that "popular" has become nearly synonymous with "loose" and "unreliable." For instance, after finding that this author credits Post and Hawley with a world's record of 1,355 miles in a drifting balloon, the discerning reader (who remembers that this claim has been reduced to 1171.3 miles which is not a record), begins to suspect other statements. Again, it is stated that some of the instruments of the unfortunate Arctic explorer, Andree, have been recovered from the Esquimaux, but we have yet to see an authentic account of that find. Walter Wellman is recorded here as starting on his sensational transatlantic venture from Asbury Park whereas we distinctly remember the place as Atlantic City. A photograph of the Wellman balloon, at the time of rescue in midocean, is labeled "Starting for Europe, Oct. 15, 1910."

The book opens with very general matter—a chapter of definitions, another on the air, and one on the physics of flying. Then the historical development of heavier-than-air machines is briefly reviewed. One chapter describes prominent successful types of biplane flyers and another chapter similarly tells about monoplanes. A few pages are devoted to multiplane designs and to the almost forgotten (by the public) helicopters and ornithopters. There is a chapter describing how the different inventors and aviators manage their craft; much of this part consists of direct quotations.

One chapter is entitled "How to Build" and this is largely given up to a presentation of plans for a machine like "La Demoiselle" the diminutive type designed by Santos-Dumont and dedicated to the public. The better known makes of gasoline engines, and a few others not quite so well advertised, are described in a general sort of way in a chapter which also emphasizes the importance of a good engine for successful flying.

To those who have not the money to purchase aeroplanes, at the present rather elevated prices, or who prefer perhaps not to risk their bones quite yet, the chapter on making and flying tiny models will appeal most. When that pastime becomes too tame, there is another chapter in this book to be remembered—that on the sport of gliding, wherein the fun of coasting down aerial slopes is invitingly pictured. The reader indeed is given plans for a glider which he may construct himself for a few dollars. The chief value of the glider seems to be as a sort of transitional device which the novice is to abandon for power-driven flyers as confidence increases and the sport of gliding diminishes. Here ends the discussion of flying machines proper which are dropped for the other variety of air-craft, the lighter-than-air.

About a quarter of the total number of pages is given up to balloons and ballooning. The treatment is first historical and then descriptive. The author tells how balloons are made and manipulated but with frequent caution that the amateur cannot safely make his own balloon or travel in one without instruction and experience under a competent pilot.

Three chapters are added as near-appendices. One attempts the biographies of the most of the prominent aeronauts and aviators. The second is a "chronicle of aviation achievements." Both of these, of course, fail to show the lamentable accidents, which have continued since 2, 1910, when the author stops his account. The third appendix-chapter is a glossary of technical terms used in the book.

DUST AND ITS DANGERS.—By T. Mitchell Prudden, M. D., Author of "The Story of the Bacteria," "The Great American Plateau," Etc. Second edition. New York and London: G. P. Putnam's Sons. Cloth; 5 × 7 ins.; pp. 113; four plates and six text figures. 75 cts., net.

Twenty years ago Dr. Prudden published a brief non-technical review of what was then known regarding dust as a bearer of disease germs. Although other germs were taken into account and the general principles underlying the spread of communicable diseases by means of dust were set forth, the volume dealt more particularly with dust in its relation to tuberculosis of the lungs, or consumption. In the revision before us the author does not seem to have found it necessary to make any very extensive changes or additions to the present edition. He has inserted some general and tuberculosis death totals for as late as 1907, and made references to such recent hygienic methods of dealing with dust as vacuum cleaners. The data on dust contents of air in various exposed places seem to be practically unchanged from those given 20 years ago, notwithstanding many observations which have been made since then. While the general results of these observations do not materially affect the main thesis of the author, yet one might naturally expect to find references to recent observations on bacterial contents of street dust and, particularly, to Dr. Geo. W. Soper's studies a few years ago of the air in the New York Rapid Transit Subway.

The book is pleasantly written and contains much sound doctrine, and should continue to serve as useful a purpose in the future as it has in the past in directing public attention to the hygienic control of dust in order to lessen the spread of communicable diseases.

A CITY PLAN FOR ROCHESTER.—A Report Prepared for the Rochester Civic Improvement Committee by Arnold W. Brunner, Architect; Frederick Law Olmsted, Landscape Architect, and Bion J. Arnold, Traction Expert in Consultation. Rochester, N. Y.: City Doc. Stiff paper; 9½ × 12½ ins.; pp. 39; two maps and many illustrations.

It is a pleasure to record the appearance of another study of possible improvements in the general plan of one of our American cities. This particular report is divided into three parts: (1) the center of the city, including a proposed new city hall and civic center, a railroad station, plaza and approach, river and old canal bed improvements and a scheme for uniting the railroads, bridges, etc.; (2) the street system, with suggestions for improving and extending both main thoroughfares and local streets; (3) the park system, embracing suggestions for neighborhood parks, rural parks and reservations, connecting parkways and comprehensive system of outlying parks and parkways.

The report throughout is brief and directly to the point. The relatively few illustrations are well chosen, and are in many instances made particularly effective by giving contrasting pictures showing opportunities for improvement in Rochester alongside of actual improvements which have been carried out elsewhere. One of the most striking of these contrasts is afforded by a view of two ordinary gas holders in a very rough and unkempt location in the river gorge at Rochester alongside of a view of gas tanks in Dresden, Germany, enclosed with well-designed masonry and with well-kept tree-planted grounds sloping down to a regulated river front.

The Design of Modern Industrial Plants for Efficiency in Production.

INDUSTRIAL PLANTS: THEIR ARRANGEMENT AND CONSTRUCTION. By Charles Day. New York: The Engineering Magazine. Cloth; 5¼ × 7½ ins.; pp. 294; 48 figures in text. $3, net.

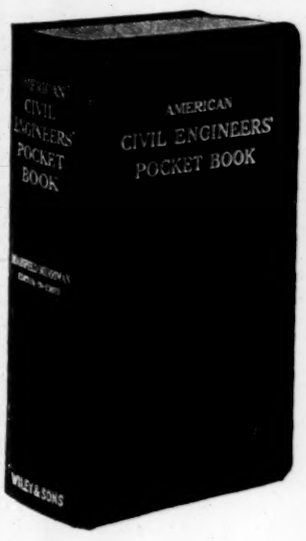
Mr. Day has here analyzed the many conditions which influence the design of a complete modern factory, and he has itemized in logical sequence the points that demand attention, the influence of data derived from investigations, and the compromises needed of the demands made on the designers. The argument made by Mr. Day is that the officers and employees of an industrial concern are so deeply concerned with problems of production that they cannot have acquired experience or developed ability necessary to lay down the best routes for the transfer of materials, for fixing the relations between production equipment and building construction, or for fixing the lighting, sanitary, fire-prevention and similar features which help toward convenience, comfort and final economy.

All of these matters leading up to the completion of final and adopted plans for a new or remodeled plant are termed here "preliminary." Following the presentation of these arguments and ideas, Mr. Day urges the importance of an outside engineering force in selecting bidders, in comparing bids, in superintending construction and equipment, etc., in transfering the business from the old to the new plant, and in training officers and employees in most effective and economical use of the new plant.

The discussions are necessarily very brief and so general that the casual reader may feel that they are not specifically for him. To give definiteness to the points involved, the author narrows down to metal-working plants and carries through an itemized analysis according to the method of procedure noted before. For these studies metal-working industries have been grouped into three classes: (1) manufacturing, (2) heavy machine work and (3) general machine work. The first class is marked by the use of lighter materials, special machinery, few high-class mechanics, and the production of standard pieces in great quantities. The second class is identified by the use of heavy, diverse materials, standard machine tools, special buildings, by the employment of all-around mechanics in the production of a definite line of standard but heavy apparatus like machine tools, motors, engines, etc. The third class is characterized by use of a great variety of materials, machines for wide variety of work, special buildings, the employment of versatile mechanics, and by the aim for effectiveness rather than great economy in production.

The discussion is further narrowed to a review of the requirements of machine shops. Finally examples of recent modern factory plants are briefly described and the volume closes with a few pages on the value of a commissioned engineering force to the manufactures compared with the expense involved in becoming a client. Mr. Day very briefly reviews the ground for his contention that an industrial concern cannot afford to attempt to build up its own betterment staff.

This book will be a desirable addition to the equipment of those who of late have run to demanding extreme economy of all industrial operations. It urges every rightful consideration of economy studies, to be sure, but it urges it in a conservative and qualified manner. As an example, early in the book it is plainly stated that the purpose and conditions of each particular business must be considered in the building of an industrial plant. That is, in one business (patent-medicine concerns) cheap and effective publicity is more important than economy in manufacture; in another business, practically everything is sacrificed to quality and to securing a product above competition. Commonly, quality of output, economy in manufacture, and effective sales effort are of equal consequence, according to Mr. Day, in meeting competition and securing a market. This need for attention to such specific demands of each concern is threaded through the discussions generally.



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Descriptive Geometry.

Reviewed by M. A. POND.*

ENGINEERING DESCRIPTIVE GEOMETRY.—A Treatise on Descriptive Geometry as the Basis of Mechanical Drawing, Explaining Geometrically the Operations Customary in the Drafting Room. By F. W. Bartlett, Commander, U. S. Navy; Head of Department of Marine Engineering and Naval Construction at the United States Naval Academy, and Theodore Johnson, A. B., M. E., Professor of Mechanical Drawing, United States Naval Academy; M. Am. Soc. M. E. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. Cloth; 6 × 9¼ ins.; pp. 159; 137 illustrations in text. $1.50, net.

The authors state in their preface that their aim is "to make descriptive geometry an integral part in a course in mechanical or engineering drawing." The book will be appreciated by many who wish to give a brief course in descriptive geometry and drawing where the student has already had some experience with drawing instruments.

The first 16 pages are devoted to explaining to the student the nature of orthographic projection. Another 16 pages are given to isometric projection, and the last eleven pages explain the layout, etc., of four large drawing sheets which are to be executed in the drafting room to illustrate those principles of descriptive geometry which have the most frequent application in practical work. Warped surfaces, shades, shadows and perspective are not included in this book.

The 144 problems in the book, placed at the ends of the various chapters, have been designed for use with a wire-mesh cage, cross-section paper or blackboard. Even in some of the more advanced problems the student is expected to make use of the wire-mesh cage. The notation is modern. The subscripts *h*, *v* and *s* are omitted in the more advanced problems wherever they are not really needed.

Instead of beginning the subject with the mathematical point, the authors have deemed it advisable to start with a tangible solid shown by a perspective drawing. In the explanation of orthographic projection, good use is made of a wire-mesh cage, the sides of which represent the planes of projection. The authors appreciate the value of the profile and auxiliary projections and have made good use of them throughout the work.

In glancing through the book one is surprised to find a number of the fundamental problems of descriptive geometry taken up in a chapter following the last chapter on the intersection of solids. The authors give their reason for this in the following sentences:

> To make the subject as tangible as possible, the finite straight line and the finite portion of a plane take precedence over the infinite line and plane. These latter require higher powers of space imagination and are therefore postponed until the student has had time to acquire such powers in the more naturally understood branches of the subject.

While the numerous illustrations given throughout the book are well chosen to illustrate the work in hand, they are not as neat and as carefully made as they should be.

CITY PLANNING AND THE PROBLEMS OF CONGESTION.—Proceedings of the Second National Conference, Rochester, N. Y., May 2-4, 1910. Boston, Mass.: Flavel Shurtleff, Secy., 19 Congress St. Cloth; 6 × 9½ ins.; pp. 182. $1.25.

The many valuable papers on city planning and congestion of population presented at the conference held at Rochester nearly a year ago are here brought together in convenient and handsome form. Among the papers on city planning mention may be made of the following:

An introductory address by Frederick Law Olmsted, Cambridge, Mass.; "The planning of Undeveloped City Areas" by Nelson P. Lewis, M. Am. Soc. C. E., Chief Engineer of Estimate and Apportionment, New York City; "Railroads—The Framework of the City Plan. The Problem and Its Study" by George R. Wadsworth, M. Am. Soc. C. E., Consulting Engineer to Metropolitan Improvements Commission, Boston, Mass.; "The Problem of Extending the City Plan" by Major Joseph W. Shirley, Chief Engineer Baltimore Topographical Survey, and "The Commission on the City Plan at Hartford, Connecticut" by Frederick L. Ford, M. Am. Soc. C. E., City Engineer.

*Assistant Professor in Civil Engineering, Cornell University, Ithaca, N. Y.

DRYING MACHINERY AND PRACTICE.—A Handbook on the Theory and Practice of Drying and Desiccating, with Classified Description of Installations, Machinery and Apparatus; Including also a Glossary of Technical Terms and Bibliography. By Thomas G. Marlow, Grinding, Drying and Separating Machinery Specialist. New York: D. Van Nostrand Co. London, England: Crosby Lockwood & Son. Cloth; 6 × 9¼ ins.; pp. 326; 17 folding plates; 174 illustrations in text; 22 tables. $5, net.

Mr. Marlow has built up what seems like a very complete catalog of processes and apparatus for freeing various materials from more or less of their water content. The work is essentially British, and American machinery is not described unless we except the product of English branches of American manufacturing companies. The greater part of the illustrations are from trade-catalogs, though that does not impair the value of the book in this case, as it might in some others. The descriptions of the different machines may be accepted as authentic, in view of the authors prefatory remark:

> The apparatus, machinery and installations of plant * * * have been chosen by the makers as worthy of bearing their name and the descriptions have in every case been passed by them.

The author first outlines various ways of "drying"—gravitation, mechanical separation, absorption, condensation, evaporation, etc. In these general descriptions, specific apparatus is mentioned only to illustrate some remark. The greater part of the machinery described is found after more detailed accounts of the several methods of drying.

As might be expected, the art of drying by evaporation has monopolized two thirds of the book. The author takes up here heat and thermal capacity calculations, air as a vehicle for moisture, heating and blowing apparatus, trucks, conveyors, drying floors and rooms, racks, cylinders, ovens, etc.

One appendix is a bibliography on drying and desiccating. Another appendix is a glossary of terms which the author has thought necessary on account of the rather loose and inconsistent use of many terms found in catalogs, etc. Many expressions which are familiar to engineers generally are included that the layman may better understand the text. Also a few terms are included in the glossary, because remotely related to the terminology—though not to the art of drying—such expressions as "gassing" textiles, "dry well" of a gasometer, "dry sand" of the foundry, "dry plate" of the photographer, "dry goods" of trade, "dry-foundered" horses, etc.

TRAITE DE TOPOGRAPHIE.—By A. Pelletan, Inspecteur Général des Mines, Professor a l'Ecole Nationale Superieur des Mines (2d Edition). Paris: Ch. Beranger, 15 Rue des Saints Péres. Cloth; 6½ × 9¾ ins.; pp. 528; 348 cuts in the text. Price, 20 francs ($6).

The first 150 pages of this book (or over 25% of its contents) deal with the principles of optics and practical astronomy; the forms of lenses, refraction and diffraction, the planetary system, the determination of the meridian, the determination of time, and other fundamental matters. The theory of errors, and the methods of compensating for errors in observations are dealt with in the next 60 pages. Methods of surveying the topography by triangulation, by observations radiating from certain points, and by leveling, are disposed of in about 12 pages.

The instruments used in surveying are next taken up, in about 130 pages. Transits and theodolites, levels and sighting levels, compasses, tacheometers, telemeters and other distance-reading instruments, plane tables, and measuring chains and tapes are included. All the instruments are illustrated by line engravings instead of by half-tones. An inconvenient feature is the absence of titles to the cuts, so that in many cases several pages have to be examined to find reference to the number by which the cut is designated.

Methods of surveying and leveling in the open and in tunnels are dealt with in 120 pages. The book concludes with 30 pages on "photogrametry" or the art of surveying by means of photography. This may be done by means of panoramic views covering a considerable range of view, or by means of ordinary views so taken as to overlap. The methods and instruments are described.

The book is handsomely printed in large and clear type.

LONDON STATISTICS, 1909-10.—Statistics of the Administrative County of London, and of the Services Carried On Therein; Together with Statistics of the Adjacent Districts. Vol. XL. London, England: P. S. King & Son. Cloth; ins.; pp. 592. Price, 5s.; American price, $1.

An examination of this large, closely ked volume of London statistics increases the ... which any one interested in municipal ... the United States must feel on realizing ... a single one of our cities publishes a wor... nual volume of the same general characte... gret is heightened when one notes that the ... before us is the twentieth dealing with st... of London and vicinity. Obviously, a criti... tice of such a long-established publication ... called for. All we need to say further is ... line the general contents of the present vo...

The main divisions are as follows: Machi... of Public Administration in London, including ... riety of election figures; Non-Administrati... tistics, embracing the populations of the ... boroughs and districts comprising Greater ... don, together with vital, meteorological, lab... charity statistics, the latter relating to in... Public Assistance, including pauperism and ... of employment; Health Services, including ... health in general, hospitals, drainage and di... of refuse, disposal of the dead, public bath... wash-houses, parks and other subjects; Regula... tive Services, including buildings, petroleum, smoke consumption, explosives, weights and measures, various forms of regulation of labor, theaters and liquor licensing; Protective Services, embracing police courts and prisons, and fires, under which head statistics of fire insurance and comparative fire department statistics for London, Paris, Berlin and Vienna are given; Educational Services, including also public libraries and museums; Transit and Exchange Services, including all sorts of transportation, together with Thames and Lea conservancy work, markets and food supply and post office and telephones; Supply Services, including water, gas and electricity; and, finally, Public Finance, under which is given a large mass of statistics on imperial and local taxation, local expenditure and revenue and various forms of local indebtedness.

Two features of the volume which deserve particular mention are (1) a consolidated index to statistics published in the annual reports of the councils of the thirty metropolitan boroughs which form the administrative county of London, and (2) a remarkably comprehensive index (32 pages) to the whole of this statistical report.

The promptness of publication of the report is commendable, for, although some of the information is for 1910, the title page bears the date of September of that year, which is in marked contrast with some other important statistical reports.

A HOUSE OF BRICK.—Prepared and published by The Building Brick Association of America, Flat Iron Bldg., New York, N. Y. Paper; 8 × 10½ ins.; pp. 95; illustrated. Price, 50 cts. Also smaller pamphlets.

The 95-page book ("A House of Brick") presents numerous designs for brick residences of moderate cost, from $4,000 upward. For each design there is a perspective elevation accompanied by small plans. There are views also of some of the noted old brick residences of New England, Pennsylvania and the South. Four short articles deal with the following: (1) the comparative merits of brick and frame construction; (2) the beauty, low maintenance cost, and fireproof properties of brick houses. Of the pamphlets, "A Revolution in Building Materials" (5 × 7¼ ins.; pp. 36), presents the advantages of brick construction in cost, appearance, durability, comfort and safety. Four smaller pamphlets (3¼ × 6¼ ins.; pp. 8) contain reprints of the four short articles in the book first mentioned.

These publications have been prepared by the Association for the special purpose of educating the public (and owners, architects, builders and contractors, also) as to the economic and other advantages of brick buildings as compared with those of wood construction. They relate to private residences, but it is intended to continue this line of education in regard to such buildings as stables, apartment houses, factories, warehouses, etc.

POPULAR HAND BOOK FOR CEMENT AND CONCRETE USERS.—A Comprehensive and Popular Treatise on the Principles Involved and Methods Employed in the Design and Construction of Modern Concrete Work. By Myron H. Lewis, C. E., Author of "Examinations for Civil Engineers," "Waterproofing of Concrete," Etc., and Albert H. Chandler, C. E., Author of "Materials Employed in Construction." New York: The Norman W. Henley Publishing Co. Cloth; 6¾ × 9¾ ins.; pp. 430; 126 illustrations in text and 38 tables. $2.50, net.

There is great need that laymen, small contractors, masons, and other non-technical men who are interesting themselves in the construction of concrete, should have a better knowledge of the subject than they ordinarily have, because it seems safe to say that ignorance is responsible for more errors in concrete building than intent to defraud. Any book, then, that will help these men to an appreciation of the difficulties in concrete work as well as the extent of its possibilities has a certain value. Such a book is the one noted above. In some of its technical statements, it is in error, in many more it is inadequate, its authority is rather too largely from the trade publications of cement companies, but some at least of these faults can be excused in a "popular handbook."

CONCRETE HOUSES AND COTTAGES.—In two volumes. Vol. I.: Large Houses; Vol. II.: Small Houses. New York: The Atlas Portland Cement Co., 30 Broad St. Stiff paper; 9¾ × 12½ ins.; pp. 240; illustrated. $1 per vol.

With the increasing appreciation of the nature of concrete design and of the details of concrete construction, there is growing a like increase in the use of concrete for residence buildings. To the casual observer, this growth may not be apparent because of the still great proportion of brick, stone and frame houses in our less densely settled districts, but it is a fact that the numerous advantages to be expected from a concrete house are recommending it to many owners. The two books noted above are testimony to this growth. They give upwards of 200 examples of concrete residences, varying from country mansions costing hundreds of thousands of dollars to the two or three-room bungalow of recent popularity. Each house has a page devoted to it, with a half-tone view and in most cases floor-plans appended.

THE ANALYSIS OF PAINTS AND PAINTING MATERIALS.—By Henry A. Gardner, Director, Scientific Section, Educational Bureau, Paint Manufacturers' Association of the United States, and John A. Schaeffer, Instructor in Chemical Practice, Carnegie Technical Schools, Pittsburg, Pa. New York and London: McGraw-Hill Book Co. Cloth; 6 × 9¼ ins.; pp. 100; two text illustrations; five tables; two appendixes. $1.50, net.

Mainly a collection of established methods of analysis, from reports of the U. S. Bureau of Chemistry and similar sources, conveniently arranged and indexed; with two plates. The book is well printed, and appears free from typographical errors.—Contributed.

Topographical maps of various sections of the United States were issued by the U. S. Geological Survey during the last half of 1910 as follows:

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Princeton, Ky.
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Southern California.
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*United States base map (a wall map in 3 sheets) without contours, 49 by 76 ins.
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Yosemite National Park, adm. map (bound edition).

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THE CONSERVATION OF OUR NATIONAL WATER RESOURCES.—By William Ralph Baldwin-Wiseman, M. Sc., Assoc. M. Inst. C. E. Transactions of the Surveyors' Institution, Vol. XLIII.—Part V., 1910-1911. London: The Institution, 12 Great George St., Westminster, S. W. Paper; 5½ x 8½ ins.; pp. 99.

The author presents here a general review of the subject of water conservation in various parts of the world, including the United States. He concludes with a recommendation for a central water authority for England, under the direction of a cabinet minister. In an appendix, a table is presented giving the increase in the population and water consumption of various cities of the world (mostly British) for periods ranging from 108 to 11 years. Another table gives for 25 countries of the world statistics showing total forested and irrigated areas, total population and population per square mile, length in thousands of miles of roads, railways, canals, navigable rivers and coast line, and, finally available water power in millions of horse power. A brief bibliography is also given, and this is followed by a report of the discussion which took place after the presentation of the paper.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Proceedings of the Annual Meeting Held at Atlantic City, N. J., June 28-July 2, 1910. Vol. X. Edited by the Secretary (Edgar Marburg), under the direction of the Committee on Publications. Philadelphia, Pa.: The Society (Univ. of Penna.) Cloth; 6 x 9¼ ins.; pp. 671; two plates and many text illustrations.

It is quite unnecessary to praise the publications of the American Society for Testing Materials; their very high scientific value is universally accepted. It is sufficient merely to note here the appearance of the Proceedings of the Thirteenth Annual Meeting. It could be wished that the material would be turned in to the secretary in time for him to make earlier publication, but the very high typographic excellence of the work warrants all the trouble and time he must have put into it.

The volume this year is further enhanced in value by the frontispiece portrait of the late Mr. Charles P. Dudley, for so many years the president and moving spirit in the Society.

HEALTHY HOMES AND SUMMER RESORTS.—Sanitary Bulletin of the New Hampshire State Board of Health. By Prof. Robert Fletcher, M. Am. Soc. C. E.; Mem. State Board of Health of New Hampshire. Concord, N. H.: The Board of Health. Paper; 6 x 9 ins.; pp. 33; illustrated.

Prof. Fletcher deals in order with the disposal of sewage, garbage and other household wastes, protection of drinking water, construction of wells, etc., with particular reference to isolated houses and buildings. Numerous examples are given, illustrated by sketches. The sketches convey the idea intended by the author, but their appearance might have been greatly improved had more attention been given to the lettering. The pamphlet as a whole is thoroughly practical and full of useful suggestions.

WORKMAN'S INSURANCE AND COMPENSATION SYSTEMS IN EUROPE.—Annual Report of the Commissioner of Labor (Chas. P. Neill), 1909. In two volumes. Vol. I.—Austria, Belgium, Denmark, France, Germany. Washington, D. C.: Pub. Doc. (Dept. of Commerce and Labor). Cloth; 6 x 9 ins.; pp. 1,493.

In our issue of Dec. 15, 1910, we noted a recent volume on "Workingmen's Insurance in Europe," published by the Charities Publication Committee, Sage Foundation, and in our issue of Feb. 16, 1911, we noted a small but valuable pamphlet report on the same general subject, issued by the Commonwealth Bureau of Census and Statistics, Melbourne, Australia. The volume now before us goes over much the same ground as was covered in detail in the book mentioned and briefly summarized in the pamphlet. The huge volume issued by the United States Commissioner of Labor is but the first instalment of the results of the extensive investigation and compilation made under his direction. The volume to come will deal with Great Britain, Italy, Norway, Russia, Spain and Sweden All but some twenty-five pages of the general introduction to the volume before us relates to workingmen's insurance in Austria, Belgium, Denmark, France and Germany. It is hardly necessary to say, in view of the 1,500 pages devoted to these five countries, that their experience with accident, sickness, maternity, invalidity and old age, unemployment, and widows and orphans insurance is presented in great detail.

DISPOSAL AND PURIFICATION OF FACTORY WASTES OR MANUFACTURING SEWAGE.—By H. W. Clark, Chemist to the Massachusetts State Board of Health. Reprinted from the 41st Annual Report of the Massachusetts State Board of Health. Boston, Mass.: Pub. Doc. Paper; 5¾ x 9 ins.; pp. 67.

A condensed review of 15 years work on trades wastes is here presented and forms a valuable summary to the 21 years review of the Lawrence experiments on city sewage, published about a year ago. The main classes of wastes considered in the pamphlet before us are those from tanneries, wool scouring and washing plants, woolen mills, carpet mills and dyeing establishments. Briefer consideration is given to wastes from creameries, yeast factories, silk mills, gas works, paint mills and other establishments. Descriptions of various experimental installations are presented, including numerous analyses to show the comparative results obtained. There is no summary or description of the general problem of treating trade wastes, but conclusions are presented under some of the main heads mentioned, these conclusions of course relating to the treatment of specific wastes.

WOOD DISTILLATION, 199.—Forest Products, No. 7. Compiled in Cooperation with the Dept. of Agriculture: Forest Service, Henry S. Graves, Forester. Washington, D. C.: Pub. Doc. Department of Commerce and Labor, Bureau of the Census; E. Dana Durand, Director. Paper; 6 x 9 ins.; pp. 11.

We note this small pamphlet more particularly to call attention to the cooperation between different departments of the National Government in the collection and dissemination of statistics. This is not the first time that such cooperation has taken place, but the principle has not yet been so firmly established as to make it inappropriate to commend such cooperation and express a hope for its continuance and increase.

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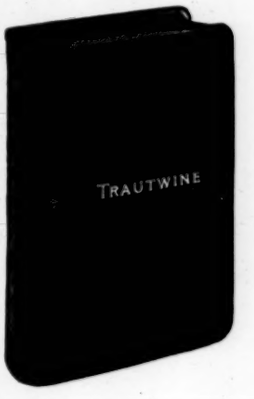

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By DELOS F. WILCOX, Ph.D.

Chief of the Bureau of Franchises, Public Service Commission, First District of New York

One year ago "Municipal Franchises," Volume One, appeared, and its value as a book of reference on a subject of vital importance was immediately recognized.

It contains a brief introductory part devoted to a general analysis of the nature and significance of public utility franchises, the ways in which they are acquired and the various means adopted at different times and in different places, to protect the public interests in connection with the operation of public utilities by private corporations. It also contains a much larger part devoted to a description of typical franchises actually in operation in various cities of the United States, covering those utilities which are distributed by pipes or wires in the public streets, namely: electric light and power, the telephone, the telegraph, messenger and signal service, electrical conduits, water supply, sewerage, central heating, refrigeration, transmission of mail and merchandise by pneumatic power, pipe line distribution of oil and artificial and natural gas.

VOLUME TWO, about to be published, includes a part devoted to a description of local transportation franchises in a large number of American cities. The utilities considered are street railways, elevated railroads, subways, interurban railways, bridges, viaducts, toll roads, depots, belt line railroads, spur tracks, docks, markets, ferries and omnibus lines.

With the help of the carefully prepared index those readers who desire to refer to a particular city or a particular subject will have no difficulty in finding everything there is in the book bearing on the matter in which they are especially interested. The author has also taken the precaution to place early in the volume a chapter on "Elements of a Model Street Railway Franchise," which is especially commended to the attention of his readers, as it contains constructive suggestions which are deemed to be important. Every one who consults this volume should get the author's point of view as respects the public nature of the street railway and the imperative necessity of gradually amortizing the capital now invested in the business instead of continuing the policy of reckless finance which has been characteristic, in large measure, of street railway companies.

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